

# Science Curriculum at Launde

*'Equipped with his five senses, man explores the universe around him and calls the adventure science.'* - Edwin Powell Hubble

## INTENT:

At Launde, we have planned a high-quality science education for all children that is progressive. Our curriculum begins in foundation with Development Matters and then progresses alongside the National Curriculum objectives. We choose our content carefully, selecting topics which we believe are relevant to our children and our community. Content is taught in depth and wherever possible, we try to build in opportunities for cross-curricular learning.

Our priority at Launde is to make sure that children are empowered to make a difference in the world around them and are provided with the necessary skills and knowledge to help achieve and support this.

Within our ambitious curriculum, we carefully plan in lessons and investigations to teach children essential scientific enquiry skills in order to create independently thinking scientists. We ensure that all children develop their own scientific knowledge and understanding through our rich, hands-on and exciting lessons and experiences. We want our children to develop the confidence to speak in front of others and share their opinions and reasoning. We want our children to be excited, curious and to be asking questions.

We want our children to carry this curiosity forward, from primary school through to secondary school and from there to one of many career choices, using science on a daily basis to improve the world we live in and the lives of those around us.

## IMPLEMENTATION:



At Launde, we implement our learning objectives through small steps whilst also giving children the opportunity to access information in different ways and providing them with means of support along their journey. The curriculum has been carefully sequenced by experienced staff to ensure that children can steadily build upon their disciplinary skills, as well as increase their awareness of substantive science knowledge, as the curriculum progresses. At the start of each topic, knowledge organisers are provided which set out the substantive knowledge, scientific skills, terminology and other important information pertinent to each topic. Children are encouraged to use the organisers at the start of each new topic, during the topic itself and at the conclusion. They serve to introduce the topic, provide information and explanations, and to act as a review checklist to ensure no elements of learning have been overlooked. Used correctly they help children maximise their learning capabilities. Each topic is sequenced into weekly sessions where children are provided with exciting, hands-on experiences.

At Launde we are aware that children often struggle to retain their learning and commit this to their long-term memories. Therefore, we start each topic by recapping from our previous learning by means of questions, hooks or stimuli. Throughout the topic, staff plan in specific investigations to assess children's working and scientific skills, as well as an end of topic test in the form of a Kahoot assessment. Results are recorded and tracked as the topic progresses. Children who are identified as potentially struggling are given differentiated support throughout.

We have a vast range of resources and equipment available in our Science Library which enables children to carry out practical and hands on experiments to support their learning. Children are encouraged to work together in teams to carry out investigations, and to respect and learn from one another's opinions. All children are expected to participate.

Staff are provided with Tig Tag logins which help them to help plan and resource lessons and to keep updated with the latest professional development advice and to implement any advice accordingly. To support children's learning further and raise awareness of science, we run a number of events throughout the year to engage children in further science learning. At Launde we are lucky to have a high percentage of our children's parents who are, or have been involved, in STEM jobs. To inspire further generations to aspire to a STEM job, each year we involve our Year 6 students in a careers event whereby we invite parents with STEM jobs to showcase their jobs at this event. They explain what they do, how this impacts the community and where possible, bring in tools, equipment, graphics and other resources to demonstrate. Children are able to look at or handle the equipment and ask questions. This event has proved to be hugely popular and a great influence on children's aspirations and the parents involved were thrilled to be given the opportunity to work alongside potential future scientists.



Every year we also take part in British Science Week where we run poster competitions for children to showcase their favourite science learning to both parents and peers. We also run class competitions on topical environmental matters in order to raise awareness of world-wide issues. This gives children further chance to display their science knowledge and scientific skills. Our competitions run from Foundation stage to Year 6 and involve the whole school. Additionally, we work closely with an external provider, Aveeno, to run after school science clubs throughout the year for KS2 children to develop their scientific curiosity further.

To support parental engagement, we provide termly science newsletters, highlighting the learning being taught that term across the school as well as providing extra information on how to support science learning at home.

### IMPACT:

At Launde, we want to ensure that our science teaching helps children not only acquire the appropriate age related knowledge, but also skills which will provide the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Teachers will assess children at the end of each unit and this will be passed up with the cohort so future teachers are aware of the strengths and weaknesses of the class. This gives teachers a strong understanding of whether certain objectives may need revising before knowledge is built on.

All children will have:

- A wider variety of skills linked to scientific knowledge and understanding, and scientific enquiry/investigative skills.

- Children will be able to refer to prior knowledge to support their learning in each year group and as a result, they will apply this to scientific enquiry/investigation.
- A richer vocabulary which will enable to articulate their understanding of taught concepts.
- High aspirations, which will see them through to further study, work and a successful adult life.

## LONG TERM PLAN

We map out our curriculum to ensure skills are revisited throughout the children's time at our school and previous skills are built upon.

|    | Autumn 1  | Autumn 2  | Spring 1   | Spring 2  | Summer 1   | Summer 2                                  |
|----|---|---|--|---|--|---|
| FS | Biology – seasonal changes<br>Physics -sound                    | Biology -Animals including humans                               | Biology – seasonal changes<br>Chemistry- changes in matter | Biology- nocturnal animals<br>Chemistry – materials | Biology – seasonal changes<br>Physics-light and shadow     | Physics-light and shadow                  |
| Y1 | Biology – seasonal changes<br>Biology -Animals including humans | Biology -Animals including humans<br>Biology – seasonal changes | Chemistry -Materials                                       | Biology – seasonal changes                          | Biology - plants   | Biology – seasonal changes                |
| Y2 | Biology -Animals including humans                               | Biology -Animals including humans                               | Chemistry -Materials                                       | Biology – plants                                    | Biology -Living things and their habitats                  | Biology -Living things and their habitats |
| Y3 | Biology - plants  | Physics -Forces and Magnets                                     | Chemistry -Materials<br>Rocks                              | Chemistry -Materials<br>Rocks<br>STEM               | Biology -Animals including humans                          | Physics -Light                            |
| Y4 | Biology -Animals including human's teeth and digestion          | Chemistry -Materials<br>States of matter                        | Physics -Sound   | Physics - Electricity                               | Physics – Electricity<br>Biology -Animals including humans | Biology -Living things and their habitats |
| Y5 | Physics – Earth and Space                                       | Physics -Forces and Magnets                                     | Chemistry -Materials                                       |   | Biology -Animals including humans                          | Biology -Living things and their habitats |
| Y6 | Biology -Evolution and inheritance                              | Biology -Animals including humans – circulation systems         | Biology -Animals including humans – digestive systems      | Biology - Inheritance                               | Physics -Light   | Physics - Electricity                     |

## PROGRESSION OF SCIENTIFIC SKILLS

|                                | Year 1   | Year 2  | Year 3   | Year 4  | Year 5   | Year 6  |
|--------------------------------|--|---|--|---|--|---|
| Answering and asking questions | Ask simple questions and recognise they can be answered in different ways.   | Ask simple questions and recognise that they can be answered in different ways using more <b>complex scientific vocabulary</b> .  | Ask relevant questions and use different types of <b>scientific enquiries</b> to answer them.  | Ask relevant questions and choose a <b>scientific enquiry</b> to best answer them.  | Plan different types of scientific enquiries to <b>answer questions</b> , including <b>recognising and controlling variables</b> where necessary.  | Plan different types of scientific enquiries to <b>answer their own or others' questions</b> , including <b>recognising and controlling variables</b> where necessary.  |
| Scientific enquiry (DO)        | Use <b>simple equipment</b> to <b>observe</b> .<br><br>Begin to <b>perform</b> simple tests.<br><br>Begin to <b>identify</b> and <b>classify</b> . | Use simple equipment to <b>observe</b> closely including changes <b>over time</b> .<br><br>Perform simple <b>comparative test</b> .<br><br><b>Identify, group</b> and <b>classify</b> . | Set up simple practical enquiries, <b>comparative</b> and <b>fair tests</b> .<br><br><b>Gather, record, classify</b> and <b>present data</b> in a variety of ways.<br><br><b>Identify differences, similarities</b> or <b>changes</b> related to simple scientific ideas and processes | Set up simple practical enquiries, <b>comparative</b> and <b>fair tests</b> .<br><br><b>Gather, record, classify</b> and <b>present data</b> in a variety of ways.<br><br><b>Identify differences, similarities</b> or <b>changes</b> related to simple scientific ideas and processes.<br><br>Make <b>systematic</b> and <b>careful observations</b> and where appropriate, take <b>accurate measurements</b> using standard units, using a <b>range of equipment</b> including <b>thermometers</b> and data loggers | <b>Take measurements</b> , using a range of scientific equipment with increasing accuracy and <b>precision</b> , <b>taking repeat readings</b> when appropriate.   | <b>Take measurements</b> , using a range of scientific equipment with increasing accuracy and <b>precision</b> , <b>taking repeat readings</b> when appropriate.  |
| Review findings                | Begin to <b>gather</b> and <b>record data</b> to help answer questions.  | <b>Gather</b> and <b>record data</b> to help in answering questions including from <b>secondary sources</b> of information  | <b>Record findings</b> using <b>simple scientific language</b> presented in different ways<br><br>Report on findings from enquiries, including <b>oral</b> and <b>written explanations</b> displays or presentations of results and conclusions  | <b>Gather, record, classify</b> and present data in a <b>variety of ways</b> to help in answering questions.<br><br><b>Record findings</b> using <b>simple scientific language</b> , drawings, labelled diagrams, keys, bar charts, and tables<br><br>Report on findings from enquiries, including <b>oral</b> and <b>written explanations</b> displays or presentations of results and conclusions   | Record data and <b>results</b> of increasing complexity using <b>scientific diagrams and labels</b> , classification keys, tables, scatter graphs, bar and line graphs<br><br>Report and <b>present findings</b> from enquiries, including <b>conclusions</b> , casual relationships and <b>explanations</b> of and <b>degree of trust</b> in results, in oral and written forms such as displays and other presentations. | Record data and <b>results</b> of increasing complexity using <b>scientific diagrams and labels</b> , classification keys, tables, scatter graphs, bar and line graphs<br><br>Report and <b>present findings</b> from enquiries, including <b>conclusions</b> , casual relationships and <b>explanations</b> of and <b>degree of trust</b> in results, in oral and written forms such as displays and other presentations |
| Analysing                      | Use own observations and ideas to <b>suggest answers</b> to questions  | Use own observations and ideas to <b>suggest answers</b> to questions <b>noticing similarities, differences</b> and <b>patterns</b>   | Use results to <b>draw simple conclusions</b> , make <b>predictions</b> for new values, <b>suggest improvements</b> and <b>raise further questions</b><br><br>Use straightforward scientific evidence to <b>answer questions</b> or to <b>support</b> his/her findings                 | Use results to <b>draw simple conclusions</b> , make <b>predictions</b> for new values, <b>suggest improvements</b> and <b>raise further questions</b><br><br>Use straightforward scientific evidence to <b>answer questions</b> or to <b>support</b> his/her findings  | Identify scientific evidence that has been used to <b>support</b> or <b>refute ideas</b> or arguments<br><br>Use test results to <b>make predictions</b> to set up <b>further comparative and fair tests</b>   | Identify scientific evidence that has been used to <b>support</b> or <b>refute ideas</b> or arguments<br><br>Use test results to <b>make predictions</b> to set up <b>further comparative and fair tests</b>  |

### Our Substantive and Disciplinary skills progression map


This shows the progression of skills and vocabulary in each area of study for science.

The document below sets out the **substantive knowledge** for each year group. This is the knowledge that involves concepts which form the underpinning structure of the subject e.g. respiration, evolution and the idea of a force. The list of substantive knowledge for science in KS1 and 2 is substantial and aims to create 'big idea' thinking in the fundamental areas of biology, chemistry and physics.

We need to frequently practice retrieving the knowledge that builds these concepts, or else we forget them, so low stakes cumulative quizzing is used to support pupils remembering and understanding.

The document also sets out the **disciplinary knowledge**. This is the knowledge scientists need so they can collect, understand and evaluate scientific evidence – it's the scientific method and involves the development of skills such as observing, measuring, testing and recording. For example, changing one variable whilst keeping everything else the same and seeing what happens.

| Biology -Plants       | Reception   | Year 1  | Year 2  | Year 3   |
|-----------------------|---|---|---|--|
|                       |   | Walk around the school grounds to identify different trees  | Grow a plant from seed  | Experiment with coloured water rising up the stem  |
| Substantive knowledge | <p>Use correct vocabulary to describe their environment</p> <p>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.</p> | <p>A wild plant seed grows where it falls. It doesn't need to be planted or cared for as it grows.</p> <p>Garden plants are plants that people choose to grow in their gardens.</p> <p>Roots take in water and nutrients from the soil and keep the plant in the ground. The stem holds the plant up and carries the water and nutrients from the roots to the leaves and flowers.</p> <p>Leaves catch sunlight to help the plant to make its own food.</p> <p>Flowers attract insects and birds. Petals are the colourful part of a flower.</p> <p>Fruit contains the plant's seeds. Seeds and bulbs grow into new plants.</p> | <p>Plants are living things that use sunlight to make their own food.</p> <p>Every plant needs water to grow and survive.</p> <p>Plants need sunlight to grow well. All plants need the right temperature to grow well.</p> <p>Seeds and bulbs can germinate and sprout underground without sunlight because they need nutrients and water. Seeds contain enough food for the plant's initial growth.</p> | <p>Plants are producers, they make their own food.</p> <p>Roots take in water and nutrients from the soil and keep the plant in the ground.</p> <p>The stem holds the plant up and carries the water and nutrients from the roots to the leaves and flowers.</p> <p>Leaves absorb sunlight and carbon dioxide to help the plant to make its own food. Water evaporates from the leaves. Flowers attract insects and birds.</p> <p>Plants need: water, light, nutrients from the soil, air and room to grow.</p> <p>Different plants vary in how much of these things they need e.g. cacti can survive in areas with little water, whereas water lilies need to live in water. Seeds/bulbs require the right conditions to germinate and grow.</p> <p>Flowering plants have specific adaptations which help it to carry out pollination, fertilisation and seed production.</p> |

|                        |  |   |   |  |
|------------------------|--|---|---|--|
|                        |  | <p>A deciduous tree loses its leaves each year.</p> <p>An evergreen tree keeps its green leaves all year round, even in the winter.</p>    |   | <p>Seed dispersal – the fully formed seeds are moved away from the parent plant. Seed dispersal improves a plants chances of successful reproduction.</p> <p>Germination – The seed starts to grow.</p> <p>Growing and flowering – The plant grows bigger and forms a flower.</p> <p>Pollination – pollen from the anther lands on the stigma and travels down the style. Fertilisation and seed formation – the pollen joins with an ovule and a seed starts to form.</p>                                   |
| Disciplinary knowledge | <p>Explore the natural world around them. (park, city, countryside)</p> <p>Make observations and drawing pictures of plants.</p> | <p>Identify a variety of common wild and garden plants, including deciduous (oak/maple/willow) and evergreen trees (conifer/pine)</p> <p>Describe the basic structure of a variety of common flowering plants, including trees.</p> <p>Explore the parts of a plant and the job they do</p> | <p>Observe and describe how seeds and bulbs grow into mature plants. (sunflower, bean, daffodil)</p> <p>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>Explore how to grow a plant from a seed.</p> | <p>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</p> <p>Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.</p> <p>Investigate the way in which water is transported within plants.</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> |
| Key vocabulary         |  | Deciduous, Evergreen trees, Leaves, Flowers (blossom), Petals, Fruit, Roots, Bulb, Seed, Trunk, Branches, Stem, oak, maple, willow, conifer, pine.  | Seeds, Bulbs, Water, Light, Temperature, Growth, soil, nutrients.   | Air, Light, Water, Nutrients, Soil, Reproduction, germination, Transportation, Dispersal, Pollination, Flower.   |



| Biology -Animals including humans | Reception  | Year 1<br>Farm visit   | Year 2   | Year 3   | Year 4<br>Dentist visit   | Year 5  | Year 6<br>Twycross Zoo-<br>South America<br>animals  |
|-----------------------------------|--|--|--|--|---|---|--|
| Substantive knowledge             | <p>Our eyes help us to see. Our ears help us to hear. Our nose helps us to smell. Our hands help us to feel and our mouth/tongue helps us to taste.</p> <p>We can jump, run, walk, roll, cry, smile, sneeze as humans.</p> <p>All living things breathe, eat, grow, move, reproduce and have senses. Non-living things do not eat, grow, breathe, move and reproduce. They do not have senses.</p> | <p>Amphibians live the first part of their lives in the water and the last part on the land.</p> <p>Reptiles are cold-blooded animals and they lay eggs. Reptiles live on land and in water.</p> <p>All mammals have hair, lungs, are warm blooded and can live on land or in water. Most mammals give birth to live babies. But there are a few mammals who lay eggs.</p> <p>A fish uses its gills to breathe, they have scales and lay soft eggs. Birds lay eggs and have a beak, they all lay eggs but not all birds can fly.</p> <p>An omnivore is an animal that eats</p> | <p>Animals including humans reproduce when they reach maturity. All animals including humans will eventually die.</p> <p>Exercise keeps animals including humans, bodies in good condition and increases survival chances.</p> <p>Animals move in order to survive. Different animals move in different ways to help them survive.</p> <p>Animals including humans need air, water, food and shelter to survive.</p> | <p>Different animals are adapted to eat different foods.</p> <p>Plants can make their own food using the energy from sunlight, however animals, including humans need to eat in order to stay alive.</p> <p>Humans need to eat different types of food.</p> <p>We can place food into five food groups according to how they help us to stay healthy.</p> <ul style="list-style-type: none"> <li>• Bread, cereal and potatoes (carbohydrates)</li> <li>• Fruits and vegetables (vitamins and minerals)</li> <li>• Meat and fish (protein)</li> <li>• Milk and dairy (calcium)</li> <li>• Fats and sugars.</li> </ul> <p>It is important to eat the right</p> | <p>The oesophagus is a muscular tube which moves food from the mouth to the stomach. The stomach is an organ in the digestive system where food is broken down with stomach acid and by being churned around. The small intestine is part of the intestine where nutrients are absorbed into the body. The large intestine is part of the intestine where water is absorbed from remaining waste food. Faeces are formed in the large intestine.</p> <p>Incisors bites and cuts. Canines tears and rips. Molars grind and premolar hold and crushes. Some people have</p> | <p>Prenatal – cells develop and grow into a foetus inside the mother’s uterus. After around 9 months, the baby is born. Infancy – rapid growth and development. Children learn to walk and talk. Childhood – children learn new skills and become more independent. Adolescence – The body starts to change over a few years. The changes occur to enable reproduction during adulthood. Early adulthood – the human body is at its peak of fitness and strength. Middle adulthood – ability to reproduce</p> | <p>The heart is an organ which constantly pumps blood around the circulatory system. The heart pumps blood to the lungs to get oxygen. It then pumps this oxygenated blood around the body. Blood vessels are the tube-like structures that carry blood through the tissues and organs. Veins, arteries and capillaries are the three types of blood vessels. Oxygenated blood has more oxygen, it is pumped from the heart to the rest of the body. Deoxygenated blood is blood where most of the oxygen has already been</p> |

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|  |  | <p>animals and plants.</p> <p>Animals that eat only animals (or meat) are called carnivores.</p> <p>Animals that eat only plants are called herbivores.</p> |  | <p>amount of food from each group. We can measure food using portions.</p> <p>Humans and many animals have skeletons to support their bodies and protect vital organs.</p> <p>Muscles are connected to bones and move them when they contract.</p> <p>Movable joints connect bones.</p> | <p>wisdom teeth but they have no function now.</p> <p>A producer is an organism, such as a plant, that produces its own food. A predator is an animal that hunts and eats other animals. Prey is an animal that gets hunted and eaten by another animal. An example of a food chain: grass (producer) slug (prey) frog (predator/ prey) owl (predator) The arrows in a food chain show the flow of energy.</p> | <p>decreases. There may be hair loss or hair may turn grey. Late adulthood – leading a healthy lifestyle can help slow down the decline of fitness and health with occurs during this stage.</p> <p><b>Parental permission sort before teaching:</b><br/> <i>Girls – larynx (voice box grows), hair grows under armpits, skin becomes oilier, breasts grow, gain hair on arms and legs, start to menstruate, pubic hair grows. Boys – larynx (voice box) grows ‘Adam’s apple’, hair grows on chest, pubic hair grows, skin becomes oilier, facial hair grows, hair under armpits grow, gain hair on arms and legs,</i></p> | <p>transferred to the rest of the body.</p> <p>Drugs, alcohol and smoking have negative effects on the body. A healthy diet involves eating the right types of nutrients in the right amounts. Regular exercise strengthens muscles including the heart muscle, improves circulation, increases the amount of oxygen around the body, releases brain chemicals which help you feel calm and relaxed, helps you sleep more easily, and strengthens bones. It can even help to stop us from getting ill.</p> <p>Nutrients are found in food and water, once broken down, the nutrients are absorbed into the blood in the small</p> |
|--|--|---|--|---|--|--|---|



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|------------------------|---|---|--|--|---|--|--|
|                        |   |   |  |  |   | <p><i>scrotum, private parts develop, become more muscular.</i></p> <p><i>Both – grow taller, sweat glands produce more sweat, all parts of the body grow.</i></p> | <p>intestine. There are tiny hairlike villi that help this process happen. The nutrients are carried in the blood to the different parts of the body that need them. Water doesn't need breaking down and moves between membranes in the body to arrive in the correct place, again via our blood.</p> |
| Disciplinary Knowledge | <p>Identify the uses of our body.</p> <p>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p> | <p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>Describe and compare the structure of a variety of common animals (fish,</p> | <p>Notice that animals, including humans, have offspring which grow into adults.</p> <p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).</p> <p>Describe the importance for humans of exercise, eating the right amounts of different types</p> | <p>Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.</p> <p>Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p> | <p>Describe the simple functions of the basic parts of the digestive system in humans.</p> <p>Identify the different types of teeth in humans and their simple functions.</p> <p>Construct and interpret a variety of food chains, identifying producers, predators and prey.</p> | <p>Describe the changes as humans develop to old age.</p>  | <p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>Describe the ways in which nutrients</p>            |

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|----------------|---|---|--|---|---|--|--|
|                |   | amphibians, reptiles, birds and mammals, including pets).   | of food, and hygiene.  |   |   |  | and water are transported within animals, including humans.  |
| Key vocabulary | Eyes, ears, nose, hands, mouth, tongue, feel, taste, touch, see, hear, smell, body. | Fish, Reptiles, Mammals, Birds, Amphibians (+ examples of each) Herbivore, Omnivore, Carnivore, Leg, Arm, Elbow, Head, Ear, Nose, Back, Wings, Beak | Survival, Water, Air, Food, Adult, Baby, Offspring, Exercise, Hygiene, Balanced Diet | Movement, Muscles, Bones, Skull, Nutrition, Skeletons, food groups, support, organs, eat well plate | Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Canine, Incisor, Molar, Carnivore, Herbivore, Predator, Prey | Foetus, Embryo, Womb, Gestation, Prenatal, Infancy, Childhood, adolescence, Early adulthood, Middle adulthood, Late adulthood/ Elderly, Growth, Development, Puberty | Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration |

| Biology -Living things and their habitats | Reception   | Year 2<br>Woodland visit<br>Pets topic link   | Year 4  | Year 5  | Year 6   |
|---|---|---|---|---|--|
| Substantive knowledge                     | <p>Highlighting similarities and differences between different animals.</p> <p>That an animal's home is called a habitat</p> <p>Animals often have similar features to live in a specific habitat</p> | <p>Everything is either living, dead or has never been alive. There are 7 characteristics of living things: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition. These can be remembered using the acronym: MRS GREN.</p> <p>Different habitats are suited to different plants and animals i.e. forest,</p> | <p>Living things can be divided into groups based upon their characteristics e.g. vertebrate animals can be put into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.</p> <p>Plants can be grouped into categories such as flowering plants (including grasses)</p> | <p>A lifecycle is the journey of changes that take place throughout the life of a living thing including birth, growing up and reproduction. The life cycle of a frog (amphibian)</p> <ul style="list-style-type: none"> <li>• Egg</li> <li>• Tadpole</li> <li>• Tadpole with legs</li> <li>• Young frog</li> <li>• Adult</li> </ul> <p>A lifecycle is the journey of changes that take place throughout the life of a living thing including birth, growing up and reproduction.</p> | <p>Broad groupings, such as micro-organisms, plants and animals can be subdivided. Animals can be classified into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals).</p> <p>A classification key is a set of questions about the characteristics of living things. A classification key</p> |

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|                        | Record observations to enable change to be observed  | <p>ocean, desert, woodland. Habitats provide for the basic needs of the animals and plants that live there, such as food and shelter.</p> <p>A food chain shows how animals get food from plants and other animals. There are different sources of food e.g. crops, plants, trees, meat and milk from animals. Living things depend on each other to survive</p> <p>Mammals, reptiles, amphibians, birds and fish can be found in habitats which are suited to them. Microhabitats are small habitats where mini beasts may live (e.g. under a rock, under leaves).</p> | <p>and non-flowering plants, such as ferns and mosses.</p> <p>Environmental change affects different habitats differently.</p> <p>Human activity significantly affects the environment. Positive impacts - the positive effects of nature reserves, ecologically planned parks, or garden ponds.</p> <p>Negative impacts – negative effects of population and development, litter or deforestation.</p> | <p>Different types of organisms have different lifecycles</p> <p>Humans develop inside their mothers and are dependent on their parents for many years until they are old enough to look after themselves.</p> <p>Amphibians such as frogs are laid in eggs then, once hatched, go through many changes until they become an adult.</p> <p>Some animals, such as butterflies, go through metamorphosis to become an adult.</p> <p>Birds are hatched from eggs and are looked after by their parents until they are able to live independently.</p> | <p>helps to identify a living thing or decide which group it belongs to by answering questions.</p> <p>Variation exists within a population (and between offspring of some plants) – NB: this key idea is duplicated in Year 6 Evolution and Inheritance.</p> <p>Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. Organisms reproduce and offspring have similar characteristic patterns.</p> |
| Disciplinary Knowledge | <p>Observe and discuss the changes in nature that they notice over time</p> <p>Classify different animals – highlighting their similarities and differences.</p> <p>Record observations of</p> | <p>Explore and compare the differences between things that are living, dead, and things that have never been alive.</p> <p>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.</p>  | <p>Recognise that living things can be grouped in a variety of ways.</p> <p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (woodland/forest animals)</p> <p>Recognise that environments can change and that this can sometimes pose dangers to living things.</p>  | <p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>Describe the life process of reproduction in some plants and animals. (sunflowers/butterflies)</p>  | <p>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.</p> <p>Give reasons for classifying plants and animals based on specific characteristics.</p>  |

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|                | <p>changes that are observed.</p> <p>To describe the passing of time through a life cycle of plants, animals, mini-beasts.</p> <p>To recognise and understand the basic life cycle of a human life.</p> | <p>Identify and name a variety of plants and animals in their habitats, including micro-habitats. (pets and animals in the woodland/town)</p> <p>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.</p> |   |  |   |
| Key vocabulary | Human, life cycle, similarity, differences, habitat, classify/sort, plant, animal,  | Living, Dead, Habitat, Energy, Food chain, Predator, Prey, Woodland, Pond, Desert, Urban   | Vertebrates, Fish, Amphibians, Reptiles, Birds, Mammals, Invertebrates, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats | Mammal, Reproduction, Insect, Amphibian, Bird, Offspring | Classification, Vertebrates, Invertebrates, Micro-organisms, Amphibians, Reptiles, Mammals, Insects |

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| Biology -Evolution and inheritance | Year 6   |
| Substantive knowledge              | <p>Evolution is the process by which living things gradually change over time. Fossils provide information about living things from millions of years ago.</p> <p>Organisms reproduce and offspring have similar characteristic patterns</p> <p>Over time the characteristics that are most suited to the environment become increasingly common. Organisms best suited to their environment are more likely to survive long enough to reproduce. Variation exists within a population (and between offspring of some plants).</p> |
| Disciplinary Knowledge             | <p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>  |
| Key vocabulary                     | Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics  |

| Chemistry -<br>Materials | Reception   | Year 1  | Year 2  | Year 3   | Year 4   | Year 5  |
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| Substantive<br>knowledge | <p><b>Everyday materials</b><br/>Able to comment on unknown objects, based on their own exploration.</p> <p>Be able to talk about the changes in objects over a period of time.</p> <p>Take part in simple experiments that are led by an adult, and be able to discuss the difference or the changes in objects.</p> | <p><b>Everyday materials</b><br/>Objects are things that you can touch or see. Objects are made from different materials. Objects feel and look different based on the material they are made from.</p> <p>Some materials that objects are made from are: glass, wood, paper, metal, water, rock and plastic.</p> <p>Some words to describe materials are: shiny, soft, rough, bendy, hard and absorbent.</p> | <p><b>Use of everyday materials</b></p> <p>Materials can be changed by physical force.</p> <p>Suitability means having the properties which are right for a specific purpose, e.g. metal, wood and plastic are all suitable materials for spoons.</p> | <p><b>Rocks</b></p> <p>Igneous rock is rock that has been formed from magma or lava.</p> <p>Sedimentary rock is rock that has been formed by layers of sediment being pressed down hard and sticking together, you can see the layers of sediment in the rock.</p> <p>Metamorphic rock is rock that started out as igneous or sedimentary rock but changed due to being exposed to extreme heat or pressure.</p> <p>More layers of rock cover it. Only hard parts of the creature remain e.g. bones, shells and teeth.</p> <p>Over thousands of years, sediment might enter the mould to make a cast fossil. Bones may change to mineral but will stay the same shape. Changes in sea level take place over a long</p> | <p><b>States of matter</b></p> <p>Solids, liquids and gases are described by observable properties. Particles in a solid are close together and cannot move. They can only vibrate. Particles in a liquid are close together but can move around each other easily. Particles in a gas are spread out and can move around very quickly in all directions.</p> <p>Heating causes solids to melt into liquids and liquids evaporate into gases. Cooling causes gases to condense into liquids and liquids to freeze into solids. When water and other liquids reach a certain temperature, they change state into a solid or a gas. The temperatures that these changes happen at are called the boiling, melting or freezing point.</p> | <p><b>Properties and change of materials</b></p> <p>Different materials are used for particular jobs based on their properties: electrical conductivity, flexibility, hardness, insulators, magnetism, solubility, thermal conductivity, transparency.</p> <p>A solution is made when solid particles are mixed with liquid particles. Materials that will dissolve are known as soluble. Materials that won't dissolve are known as insoluble. A suspension is when the particles don't dissolve.</p> <p>Reversible changes, such as mixing and dissolving solids and liquids together, can be reversed by: Sieving - Smaller materials are able to fall through the holes in the sieve,</p> |

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|                        |   |  |  | <p>period. As erosion and weathering take place, eventually the fossil becomes exposed.</p> <p>Soil is the uppermost layer of the Earth. It is a mixture of different things: minerals (the minerals in soil come from finely broken-down rock), air, water, organic matter (including living and dead plants and animals).</p> | <p>Condensation and evaporation occur within the water cycle.</p> <ol style="list-style-type: none"> <li>1. Water from lakes, puddles, rivers and seas is evaporated by the sun's heat, turning it into water vapour.</li> <li>2. This water vapour rises, then cools down to form water droplets in clouds (condensation).</li> <li>3. When the droplets get too heavy, they fall back to the earth as rain, sleet, hail or snow (precipitation).</li> </ol> | <p>separating them from larger particles.</p> <p>Filtering - The solid particles will get caught in the filter paper but the liquid will be able to get through</p> <p>Evaporating -The liquid changes into a gas, leaving the solid particles behind.</p> <p>Some changes can be reversed, and some cannot.</p> <p>Irreversible changes often result in a new product being made from the old materials (reactants). E.g. burning wood produces ash. Mixing vinegar and milk produces casein plastic.</p> |
| Disciplinary Knowledge | <p>Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.</p> <p>Understand some important processes</p> | <p>Distinguish between an object and the material from which it is made.</p> <p>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</p> | <p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p> <p>Find out how the shapes of solid</p> | <p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Describe in simple terms how fossils are formed when things</p>  | <p>Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Observe that some materials change state when they are heated or cooled, and measure or research</p>  | <p>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</p>   |



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|  | <p>and changes in the natural world around them, including changes in matter.</p> | <p>Describe the simple physical properties of a variety of everyday materials</p> <p>Compare and group together a variety of everyday materials on the basis of their simple physical properties.</p> | <p>objects made from some materials can be changed by squashing, bending, twisting and stretching.</p> | <p>that have lived are trapped within rock.</p> <p>Recognise that soils are made from rocks and organic matter.</p> | <p>the temperature at which this happens in degrees Celsius (°C).</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> | <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes.</p> <p>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with</p> |
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|                |  |   |   |   |  | burning and the action of acid on bicarbonate of soda   |
| Key vocabulary | Changes, experiment, materials, soft, hard, rough, smooth, | Wood, Plastic, Glass, Paper, Water, Metal, Rock, Hard, Soft, Bendy, Rough, Smooth | Hard, Soft, Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent, Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil | Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent | Solid, Liquid, Gas, Evaporation, Condensation, Particles, Temperature, Freezing, Heating | Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing |

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| Physics-seasonal changes | Reception<br><i>To be taught each term, describing the season that is currently taking place.</i>   | Year 1<br><i>To be taught each term, describing the season that is currently taking place.</i>  |
| Substantive knowledge    | There are four seasons: Spring, Summer, Autumn, Winter.<br><br>There are lots of different types of weather: rain, sun, cloud, wind, snow, etc. | There are four seasons: Spring, Summer, Autumn, Winter. There are lots of different types of weather: rain, sun, cloud, wind, snow, etc.<br><br>Days are longer and hotter in the summer. Days are shorter and colder in the winter |
| Disciplinary Knowledge   | Understand the effects of changing seasons on the natural world around them.  | Observe changes across the four seasons.<br><br>Observe and describe weather associated with the seasons and how day length varies.   |
| Key vocabulary           | Summer, Spring, Autumn, Winter, Sun,  | Summer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark  |

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| Physics -Light        | Reception   | Year 3  | Year 6                           |
| Substantive knowledge | A shadow is caused by light hitting an object – torches, sunlight | There must be light for us to see. Without light it is dark. We need light to see things even shiny things. | Light travels in straight lines. |

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|                        | <p>That at night it is dark and during the day it is light.</p> <p>To know that the sun provides us with light in the daytime and when the sun sets it becomes night time.</p> <p>To know there are some animals that are awake during the day and some are awake during the night – nocturnal.</p> | <p>Beams of light bounce off some materials (reflection).</p> <p>The pupils control the amount of light entering the eyes. If too much light enters, then it can damage the retina. To help protect the eyes, you can wear a hat with a wide brim and sunglasses with a UV rating.</p> <p>A shadow is caused when light is blocked by an opaque object. A shadow is larger when an object is closer to the light source. This is because it blocks more of the light.</p> | <p>Light from the sun travels in a straight line and hits an object. The light ray is then reflected off the objects and travels in a straight line to our eyes, enabling us to see the object.</p> <p>We need light to be able to see things. Light waves travel out from sources of light in straight lines. These lines are often called rays or beams of light.</p> <p>A shadow is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit it, while the rest of the light can continue travelling.</p> |
| Disciplinary Knowledge | <p>Understand some important processes and changes in the natural world around them, including light</p> <p>To explore shadows using torches and objects.</p>   | <p>Recognise that they need light in order to see things and that dark is the absence of light.</p> <p>Notice that light is reflected from surfaces.</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</p> <p>Recognise that shadows are formed when the light from a light source is blocked by an opaque object.</p> <p>Find patterns in the way that the size of shadows change.</p>                            | <p>Recognise that light appears to travel in straight lines.</p> <p>Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.</p> <p>Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>   |
| Key vocabulary         | Light, dark, daytime, night time, shadows, nocturnal, diurnal.  | Light, Shadows, Mirror, Reflective, Dark, Reflection  | Refraction, Reflection, Light, Spectrum, Rainbow, Colour   |

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| Physics -Forces and Magnets | Year 3  | Year 5  |
| Substantive knowledge       | <p>Different surfaces create different amounts of friction. The amount of friction created by an object moving over a surface depends on the roughness of the surface and the object, and the force between them.</p> | <p>Gravity is a pulling force exerted by the Earth (or anything else which has mass).</p> <p>Earth's gravitational pull is the pull that Earth exerts on an object, pulling it towards Earth's centre. It is the Earth's gravitational pull which keeps us on</p> |

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|                        | <p>A force that acts between two surfaces or objects that are moving, or trying to move, across each other. Magnetic force can act at distance.</p> <p>Magnets produces a magnetic force that pulls certain objects towards it.</p> <p>Objects which are attracted to a magnet are magnetic. Objects containing iron, nickel or cobalt metals are magnetic.</p> <p>Objects which are attracted to a magnet are magnetic. Objects containing iron, nickel or cobalt metals are magnetic.</p> <p>North and south poles are found at different ends of a magnet.</p> <p>Repulsion is a force that pushes objects away. For example, when a north pole is placed near the north pole of another magnet, the two poles repel (push away from each other).</p> | <p>the ground. Unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way. Friction is a force against motion caused by two surfaces rubbing against each other.</p> <p>Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.</p> |
| Disciplinary Knowledge | <p>Compare how things move on different surfaces.</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</p> <p>Observe how magnets attract or repel each other and attract some materials and not others.</p> <p>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.</p> <p>Describe magnets as having two poles.</p> <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>   | <p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p> <p>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>  |
| Key vocabulary         | Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull  | Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulley   |

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| Physics -Sound        | Reception  | Year 4   |
| Substantive knowledge | You use your ears to hear and listen for sounds. | Sound is a type of energy. Sounds are created by vibrations. The louder the sound, the bigger the vibration. |

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|                        | <p>Sounds can be natural or man-made – e.g. nature or traffic sounds</p> <p>Sounds can be loud or quiet, high or low.</p>   | <p>Inside your ear, the vibrations hit the eardrum and are then passed to the middle and then the inner ear. They are then changed into electrical signals and sent to your brain. Your brain tells you that you are hearing a sound.</p> <p>Pitch is a measure of how high or low a sound is. A whistle being blown creates a high-pitched sound. A rumble of thunder is an example of a low-pitched sound.</p> <p>The size of the vibration is called the amplitude. Louder sounds have a larger amplitude, and quieter sounds have a smaller amplitude.</p> <p>When sound vibrations spread out over a distance, the sound becomes quieter, just like ripples in a pond.</p> |
| Disciplinary Knowledge | <p>Understand some important processes and changes in the natural world around them, including sounds</p> <p>To explore sounds within the natural environment – natural and man-made.</p> <p>To listen with increasing attention to sounds – listening walks around the environment.</p> <p>To be able to describe a sound that they have heard</p> | <p>Identify how sounds are made, associating some of them with something vibrating.</p> <p>Recognise that vibrations from sounds travel through a medium to the ear.</p> <p>Find patterns between the pitch of a sound and features of the object that produced it.</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>Recognise that sounds get fainter as the distance from the sound source increases.</p>   |
| Key vocabulary         | Listening, hearing, sounds, loud, quiet, high, low, natural, man-made   | Volume, Vibration, Wave, Pitch, Tone, Speaker   |

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| Physics - Electricity | Year 4 | Year 6 |
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| <p><b>Substantive knowledge</b></p>  | <p>A source of electricity (mains or battery) is needed for electrical devices to work.</p> <p>Electricity sources push electricity round a circuit. Electricity can only flow around a complete circuit that has no gaps. There must be wires connected to both the positive and negative end of the power supply/battery.</p> <p>Electricity can only flow around a complete circuit that has no gaps. There must be wires connected to both the positive and negative end of the power supply/battery.</p> <p>Switches can be used to open or close a circuit. When off, a switch 'breaks' the circuit to stop the flow of electricity. When on, a switch 'completes' the circuit and allows the electricity to flow.</p> <p>A conductor of electricity is a material that will allow electricity to flow through it.<br/>Metals are good conductors. Materials that are electrical insulators do not allow electricity to flow through them. Wood, plastic and glass are good insulators.</p> | <div data-bbox="1176 97 1547 475"> </div> <p>More batteries or a higher voltage create more power to flow through the circuit. Shortening the wires means the electrons have less resistance to flow through.</p> <p>Fewer batteries or a lower voltage give less power to the circuit. More buzzers or bulbs mean the power is shared by more components. Lengthening the wires means the electrons have to travel through more resistance.</p> |
| <p><b>Disciplinary Knowledge</b></p> | <p>Identify common appliances that run on electricity.</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors.</p>   | <p>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</p> <p>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</p> <p>Use recognised symbols when representing a simple circuit in a diagram.</p>  |
| <p><b>Key vocabulary</b></p>         | <p>Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators</p>   | <p>Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Amps, Volts, Cell</p>   |



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| Physics – Earth and Space | Year 5<br>Space centre trip   |
| Substantive knowledge     | <p>Earth rotates (spins) on its axis. It does a full rotation once in every 24 hours. At the same time that Earth is rotating, it is also orbiting (revolving) around the Sun. It takes a little more than 365 days to orbit the Sun. Daytime occurs when the side of Earth is facing towards the Sun. Night occurs when the side of Earth is facing away from the Sun.</p> <p>The Moon orbits Earth in an oval- shaped path while spinning on its axis. At various times in a month, the Moon appears to be different shapes. This is because as the Moon rotates round Earth, the Sun lights up different parts of it.</p> <p>The sun, moon and the Earth are astronomical objects shapes like spheres.</p> |
| Disciplinary Knowledge    | <p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>Understand the movement of the Moon relative to the Earth.</p> <p>Understand the Sun, Earth and Moon as approximately spherical bodies.</p> <p>Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.</p>   |
| Key vocabulary            | Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, Star, Constellation   |